

IN THE CLAIMS:

Please amend claims 19, 23, 24, 29, 30, and 36 as follows:

~~19. (Twice Amended) A method of manufacturing a semiconductor device comprising the steps of:~~

~~forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate;~~

~~depositing a semiconductor film comprising amorphous silicon on [an insulating surface] said silicon nitride film;~~

~~disposing a solution in contact with said semiconductor film, said solution containing a [catalyst] metal being capable of promoting crystallization of said amorphous silicon;~~

~~heating said semiconductor film and said [catalyst] metal to crystallize said semiconductor film; and then~~

~~annealing said semiconductor film by utilizing a light from a lamp to improve the crystallinity thereof,~~

~~wherein said annealing is carried out in such a manner that a temperature of a monitored single crystal silicon wafer is raised at a rate of 50 to 200°C/s and then cooled at a rate of 20 to 100°C/s.~~

~~23. (Amended) A method according to claim 19 wherein said [catalyst] metal is selected from the group consisting of nickel, palladium, platinum, copper, silver, gold, indium, tin, phosphorous, arsenic and antimony.~~

24. (Twice Amended) A method of manufacturing a semiconductor device comprising the steps of:

✓ forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate;

✓ depositing a semiconductor film comprising amorphous silicon on [an insulating surface] said silicon nitride film;

disposing a solution in contact with only a selected portion of said semiconductor film, said solution containing a [catalyst] metal being capable of promoting crystallization of said amorphous silicon;

✓ heating said semiconductor film and said [catalyst] metal to crystallize said semiconductor film wherein crystals grow through said semiconductor film in a horizontal direction with respect to said [insulating surface] substrate in a region adjacent to said selected portion; and then

✓ annealing said semiconductor film by utilizing a light from a lamp to improve the crystallinity thereof,

wherein said annealing is carried out in such a manner that a temperature of a monitored single crystal silicon wafer is raised at a rate of 50 to 200°C/s and then cooled at a rate of 20 to 100°C/s.

29. (Twice Amended) A method of manufacturing a semiconductor device comprising the steps of:

✓ forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate;

✓ depositing a semiconductor film comprising amorphous silicon on [an insulating surface] said silicon nitride film;

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X
cont'd

disposing a [catalyst] metal in contact with said semiconductor film, said [catalyst] metal being capable of promoting crystallization of said amorphous silicon;

heating said semiconductor film and said [catalyst] metal to crystallize said semiconductor film,

wherein the step of heating is carried out so that the crystallized semiconductor film does not have a (111) plane orientation.

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30. (Amended) A method according to claim 29, wherein said [catalyst] metal is selected from the group consisting of nickel, palladium, platinum, copper, silver, gold, indium, tin, phosphorous, arsenic and antimony.

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36. (Amended) A method of manufacturing a semiconductor device comprising the steps of:

forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate;

depositing a semiconductor film comprising amorphous silicon on [an insulating surface] said silicon nitride film;

disposing a [catalyst] metal in contact with at least a selected portion of said semiconductor film;

heating said semiconductor film and said [catalyst] metal to crystallize said semiconductor film wherein crystals grow through said semiconductor film in a horizontal direction with respect to said [insulating surface] substrate in a region adjacent to said selected portion; and then

annealing said semiconductor film by utilizing a light from a lamp to improve the crystallinity thereof;

wherein said annealing is carried out in such a manner that a temperature of a monitored single crystal silicon wafer is raised at a rate of 50 to 200°C/s and cooled at a rate of 20 to 100°C/s and the step of heating is carried out so that the crystallized semiconductor film does not have a (111) plane orientation.

Please add new claims 48-77 as follows.

--48. A method according to claim 19 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%.

49. A method according to claim 19 wherein said silicon nitride film is hydrogenated.

50. A method according to claim 19 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.

51. A method according to claim 24 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%.

52. A method according to claim 24 wherein said silicon nitride film is hydrogenated.

53. A method according to claim 24 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.

54. A method according to claim 29 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%.

55. A method according to claim 29 wherein said silicon nitride film is hydrogenated.

56. A method according to claim 29 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.

57. A method according to claim 36 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%.

58. A method according to claim 36 wherein said silicon nitride film is hydrogenated.

59. A method according to claim 36 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.

60. A method of manufacturing a semiconductor device comprising the steps of:

forming a silicon nitride film containing at least one hydrogen and oxygen over a substrate by using a CVD system;

forming a semiconductor film comprising amorphous silicon on said silicon nitride film;

forming a silicon oxide film on said semiconductor film;

disposing a solution in contact with said silicon oxide film, said solution containing a metal being capable of promoting crystallization of said amorphous silicon;

heating said semiconductor film and said metal to crystallize said semiconductor film; and

irradiating laser beam to said semiconductor film to improve the crystallinity thereof.

61. A method according to claim 60 wherein said CVD system is selected from plasma CVD and LPCVD.

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62. A method according to claim 60 wherein said metal is selected from the group consisting of nickel, palladium, platinum, copper, silver, gold, indium, tin, phosphorous, arsenic and antimony.

63. A method according to claim 60 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%.

64. A method according to claim 60 wherein said silicon nitride film is hydrogenated.

65. A method according to claim 60 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.

66. A method of manufacturing a semiconductor device comprising the steps of:

forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate by using a CVD system;

forming a semiconductor film comprising amorphous silicon on said silicon nitride film;

forming a layer comprising a metal on said semiconductor film, said metal being capable of promoting crystallization of said amorphous silicon;

heating said semiconductor film and said layer to crystallize said semiconductor film; and

irradiating laser beam to said semiconductor film to improve the crystallinity thereof,

wherein the step of heating is carried out so that the crystallized semiconductor film does not have a (111) plane orientation.

67. A method according to claim 66 wherein said CVD system is selected from plasma CVD and LPCVD.

68. A method according to claim 66 wherein said metal is selected from the group consisting of nickel, palladium, platinum, copper, silver, gold, indium, tin, phosphorous, arsenic and antimony.

69. A method according to claim 66 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%

70. A method according to claim 66 wherein said silicon nitride film is hydrogenated.

71. A method according to claim 66 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.

72. A method of manufacturing a semiconductor device comprising the steps of:

forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate by using a CVD system;

forming a semiconductor film comprising amorphous silicon on said silicon nitride film;

forming a silicon oxide film on said semiconductor film;

disposing a solution comprising a metal compound in contact with said silicon oxide film;

heating said semiconductor film to crystallize said semiconductor film;
and

irradiating laser beam to said semiconductor film to improve the
crystallinity thereof.

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73. A method according to claim 72 wherein said CVD system is selected from plasma CVD and LPCVD.

74. A method according to claim 72 wherein said metal compound is selected from the group consisting of nickel bromide, nickel acetate, nickel oxalate, nickel carbonate, nickel chloride, nickel iodide, nickel nitrate, nickel sulfate, nickel formate, nickel acetylacetone, nickel 4-cyclohexylbutyrate, nickel oxide and nickel hydroxide.

75. A method according to claim 72 wherein at least one of said hydrogen and said oxygen is contained at 0.01 to 2%.

76. A method according to claim 72 wherein said silicon nitride film is hydrogenated.

77. A method according to claim 72 wherein said silicon nitride film is constituted by at least silicon and nitrogen, and ratio of said nitrogen to said silicon is from 1.3 to 1.5.--